US009125458B2

(12) **United States Patent**
Grimm et al.

(10) **Patent No.: US 9,125,458 B2**
(45) **Date of Patent: Sep. 8, 2015**

(54) **MULTI-DIRECTIONAL BUCKLE ASSEMBLY**

(71) Applicant: **ILLINOIS TOOL WORKS INC.**, Glenview, IL (US)

(72) Inventors: **Michael B. Grimm**, Evanston, IL (US); **Christopher A. J. Iannello**, Rolling Meadows, IL (US); **Martin J. Nilsen**, Hampshire, IL (US); **Jon D. Burrow**, Bartlet, IL (US)

(73) Assignee: **Illinois Tool Works Inc.**, Glenview, IL (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/404,487**

(22) PCT Filed: **Jun. 3, 2013**

(86) PCT No.: **PCT/US2013/043930**

§ 371 (c)(1),
(2) Date: **Nov. 28, 2014**

(87) PCT Pub. No.: **WO2013/184594**

PCT Pub. Date: **Dec. 12, 2013**

(65) **Prior Publication Data**

US 2015/0135483 A1 May 21, 2015

Related U.S. Application Data

(60) Provisional application No. 61/656,074, filed on Jun. 6, 2012, provisional application No. 61/701,035, filed on Sep. 14, 2012.

(51) **Int. Cl.**

A44B 11/25	(2006.01)
A44B 11/00	(2006.01)
A44B 11/26	(2006.01)

(52) **U.S. Cl.**

CPC ***A44B 11/2592*** (2013.01); ***A44B 11/006*** (2013.01); ***A44B 11/2596*** (2013.01); ***A44B 11/266*** (2013.01)

(58) **Field of Classification Search**

CPC A44B 11/266; A44B 11/006; A44B 11/04; A44B 11/10; A44B 11/2526; A44B 11/2561; A44B 11/2592; A44B 11/263; Y10T 24/45524; Y10T 24/45581; Y10T 24/45529; Y10T 24/4084; Y10T 24/4019; Y10T 24/4093; Y10T 24/45534; Y10T 24/45623; Y10T 24/457

USPC ..... 24/171, 200, 265 BC, 614, 615, 616, 24/625, 633, 664

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,336,641	A *	8/1967	Hunter	24/653
3,921,262	A *	11/1975	Tanaka	24/637

(Continued)

FOREIGN PATENT DOCUMENTS

WO	2012162615	A2	11/2012

OTHER PUBLICATIONS

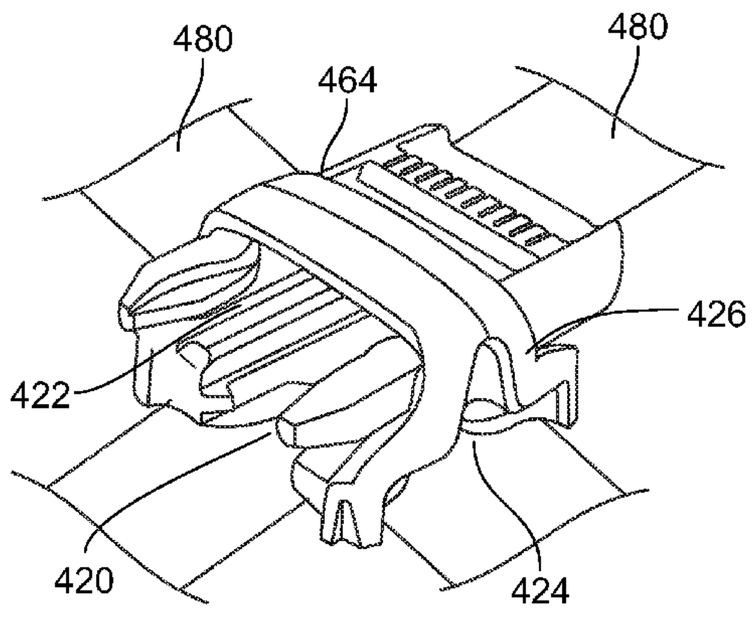
ISR and WO for PCT/US2013/043930 mailed Oct. 29, 2013.

Primary Examiner — Robert J Sandy
Assistant Examiner — David Upchurch

(57) **ABSTRACT**

A female buckle member is configured to securely mate with a male buckle member and adjustably retain webbing through multiple directions. The female buckle member may include a housing having first and second ends and first and second sides. A base of the housing may include a base connected to opposed lateral walls and an upper wall. An insertion channel is defined between the base, the opposed lateral walls, and an upper wall. The housing may be symmetrical about longitudinal and lateral axes. The first and second ends of the housing may have the same size and shape. The first and second ends are configured to receive an insertion end of a male buckle member. The female buckle member may also include a plurality of web-retainers that define a first web-retaining channel configured to adjustably retain webbing extending between the first and second ends, and a second web-retaining channel configured to adjustably retain webbing extending between the first and second sides.

19 Claims, 10 Drawing Sheets



(56) **References Cited**

U.S. PATENT DOCUMENTS

5,438,737	A *	8/1995	Anscher et al.	24/630
5,465,472	A	11/1995	Matoba	
5,604,964	A *	2/1997	Aoshima	24/632
5,709,014	A *	1/1998	Takahashi	24/614
6,061,883	A *	5/2000	Uehara	24/625
6,393,677	B1 *	5/2002	Anscher	24/630
6,408,494	B1 *	6/2002	Anscher	24/625
6,711,790	B2 *	3/2004	Pontaoe	24/633
7,296,327	B2	11/2007	Anderson et al.	
7,302,742	B2	12/2007	Pontaoe	
7,331,088	B2	2/2008	Pontaoe	
8,256,073	B2 *	9/2012	Zhang	24/634
2002/0017012	A1 *	2/2002	Sack et al.	24/633
2003/0106191	A1	6/2003	Cheng	
2004/0221432	A1 *	11/2004	Nezu	24/614
2007/0089280	A1	4/2007	Pontaoe	
2008/0028579	A1 *	2/2008	Chen	24/625
2008/0078069	A1	4/2008	Pontaoe	
2008/0222860	A1	9/2008	Pontaoe	
2009/0255101	A1 *	10/2009	Lin	24/614
2012/0054993	A1 *	3/2012	Anscher	24/634
2014/0096348	A1	4/2014	Anderson et al.	

* cited by examiner

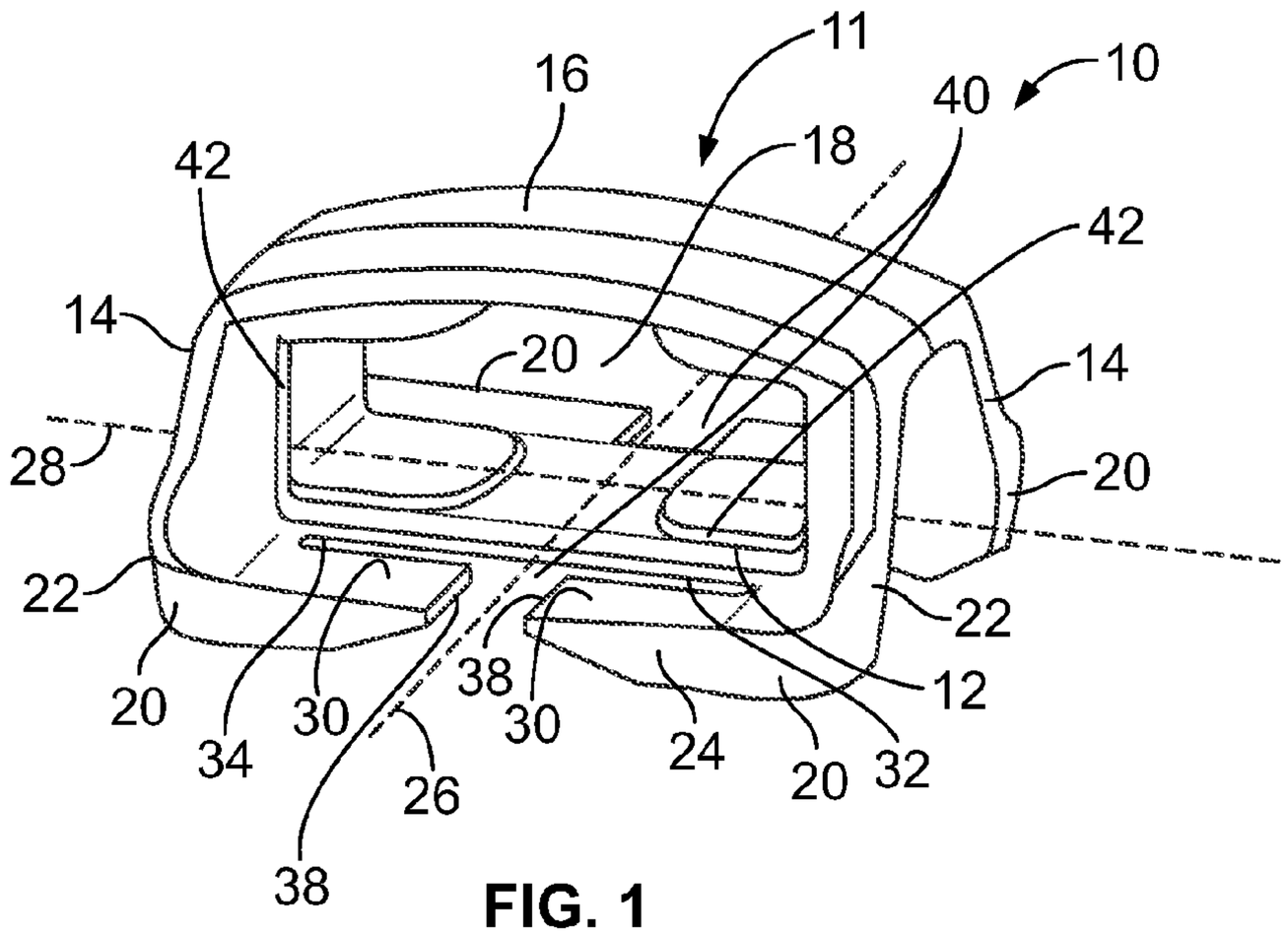


FIG. 1

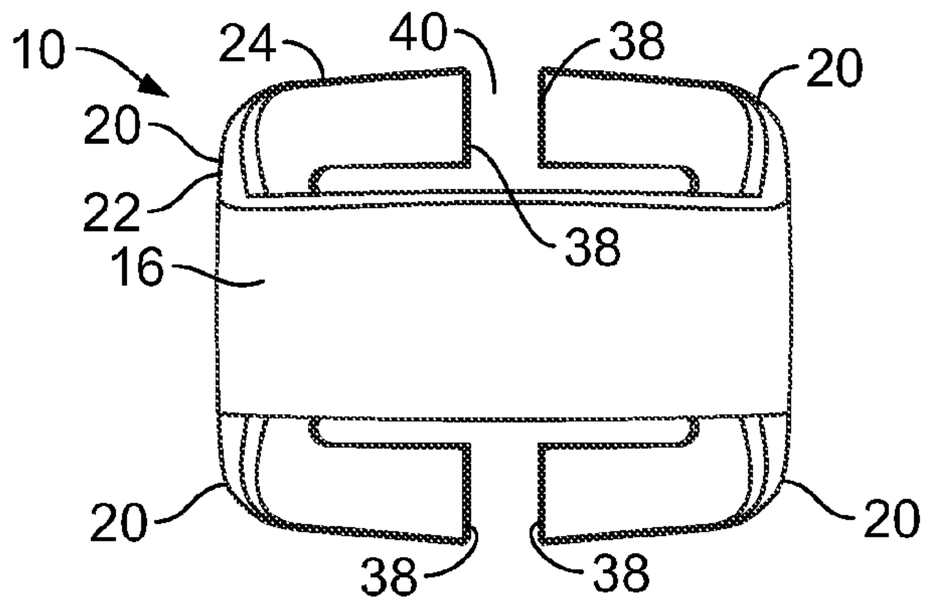


FIG. 2

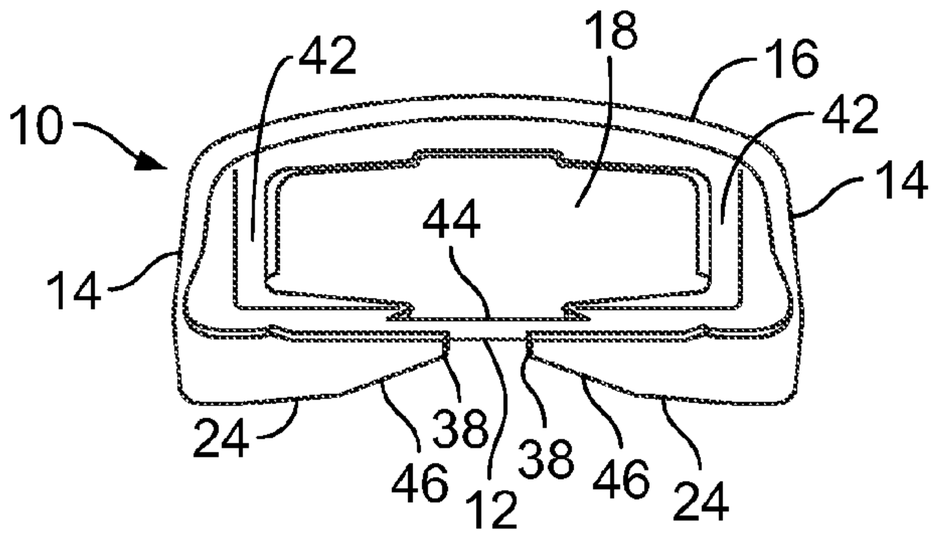


FIG. 3

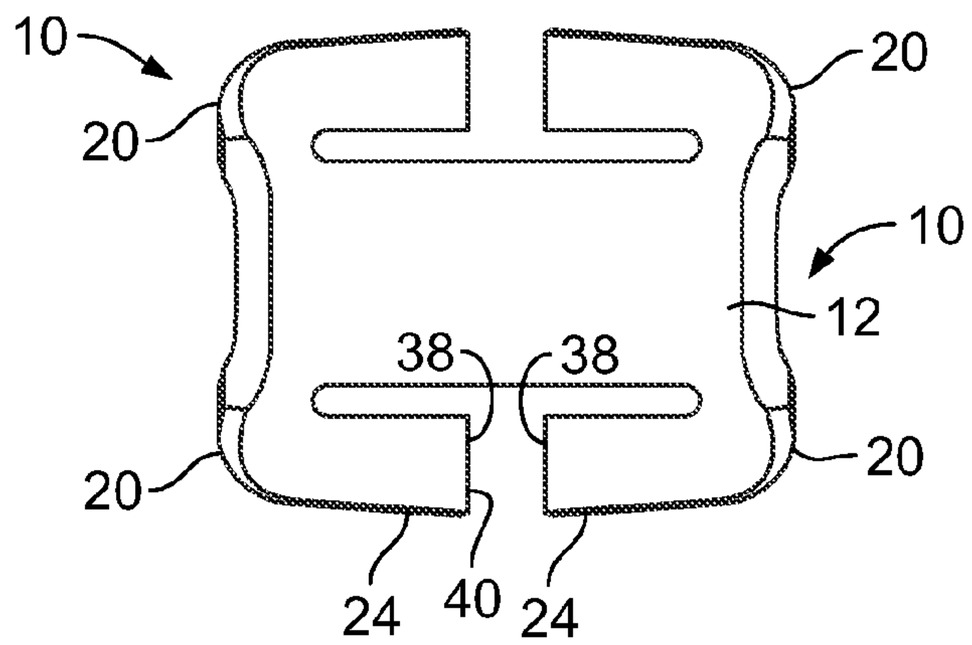


FIG. 4

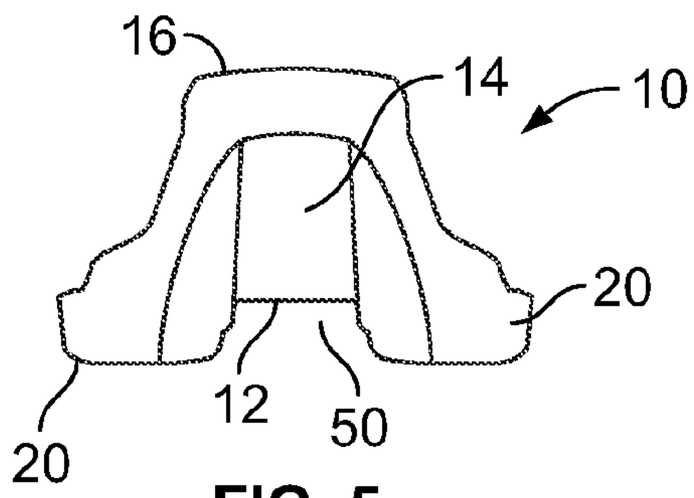


FIG. 5

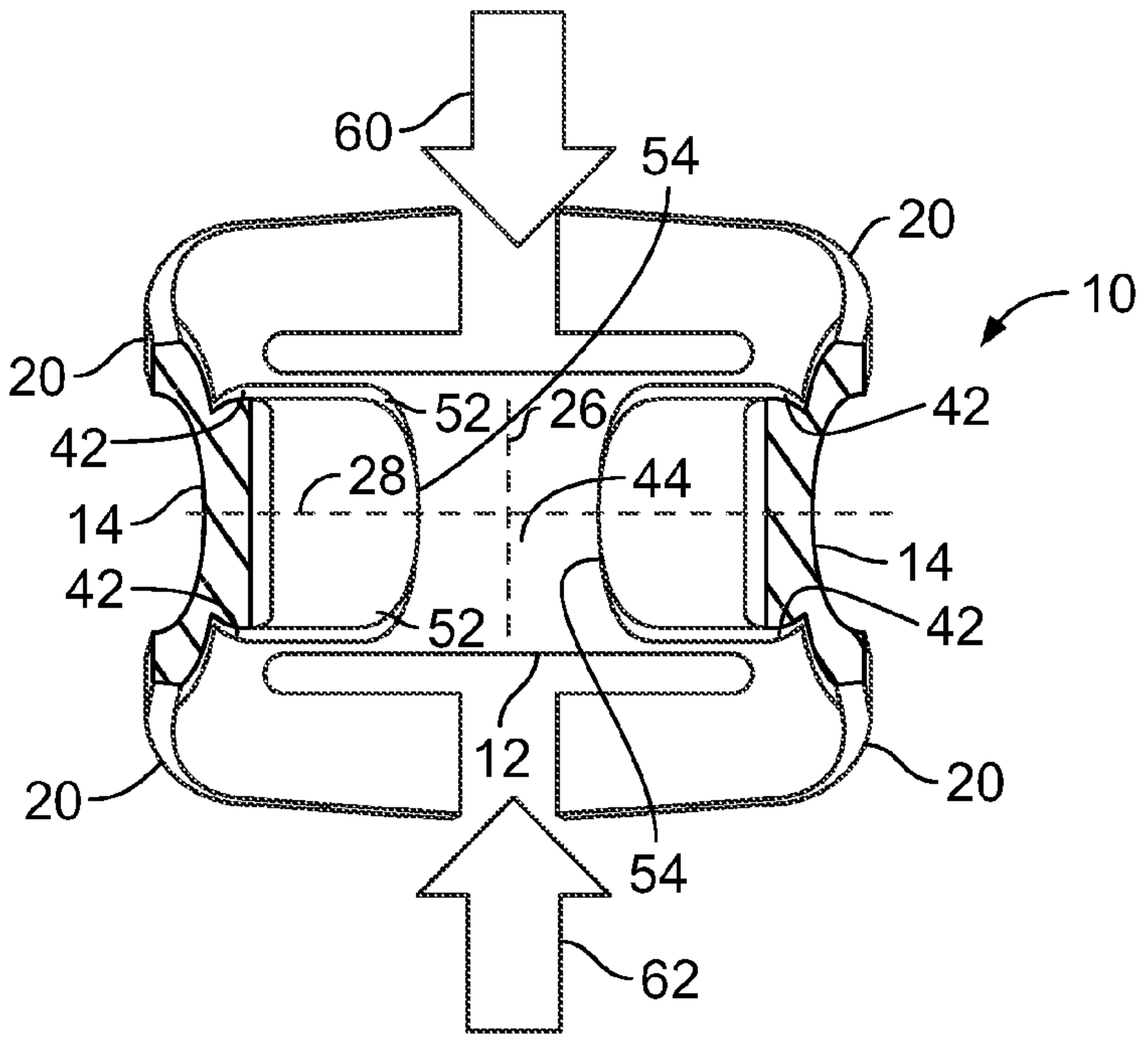


FIG. 6

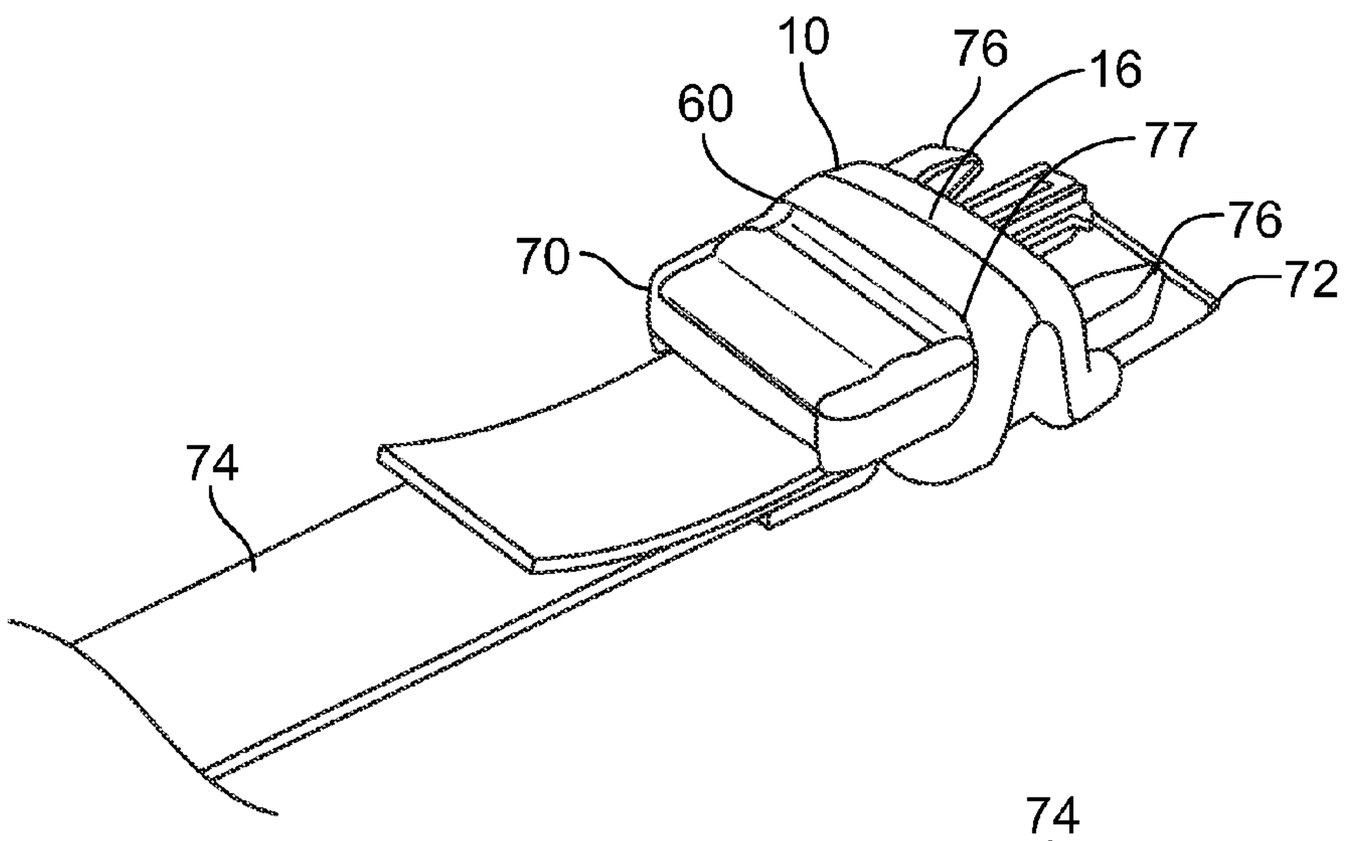


FIG. 7

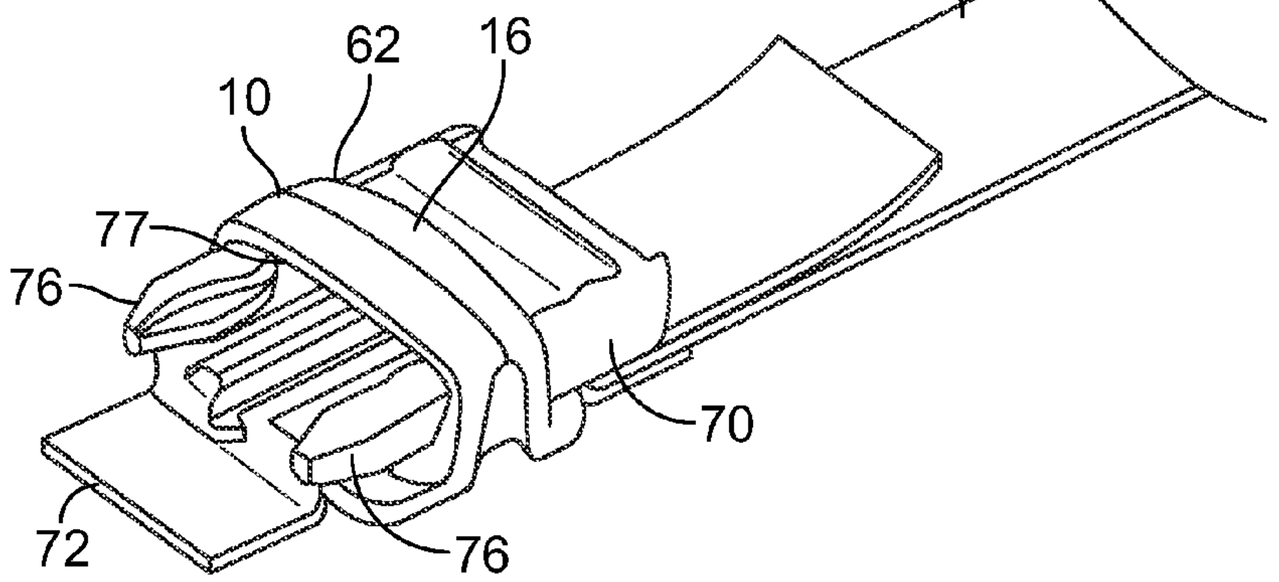


FIG. 8

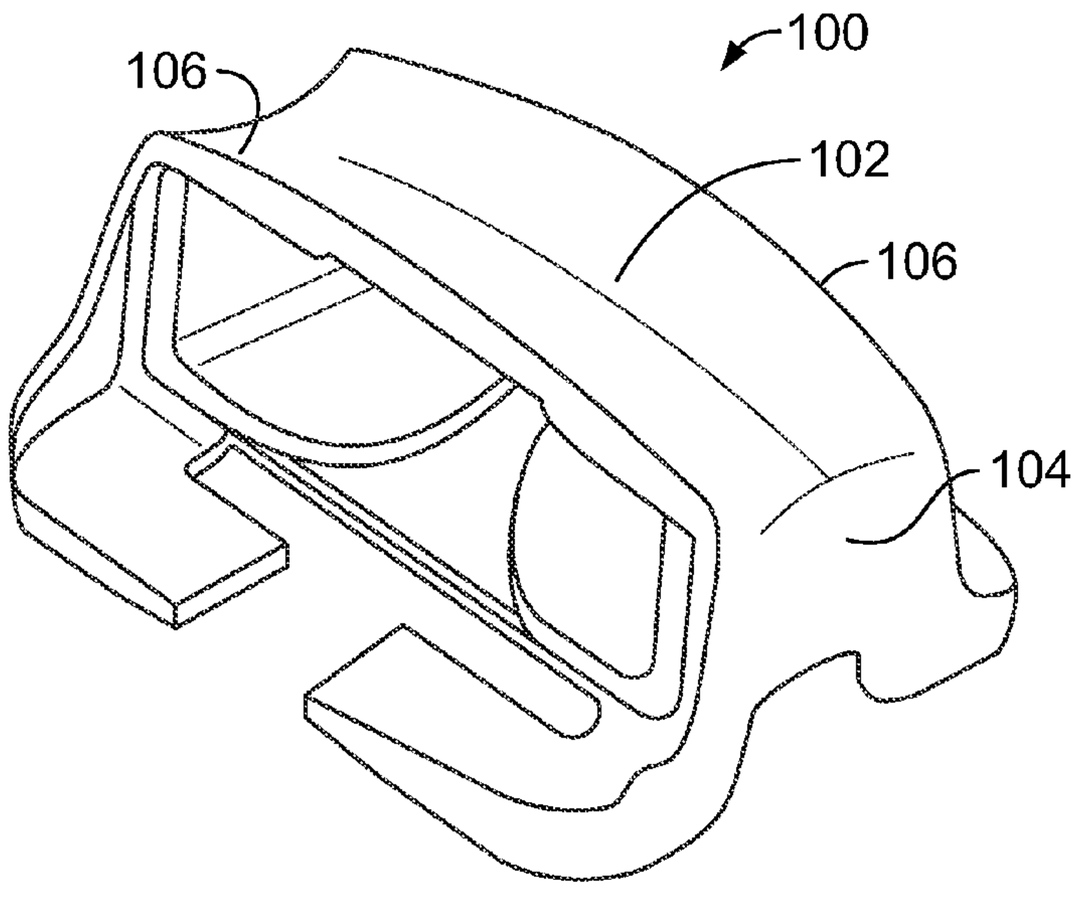


FIG. 9

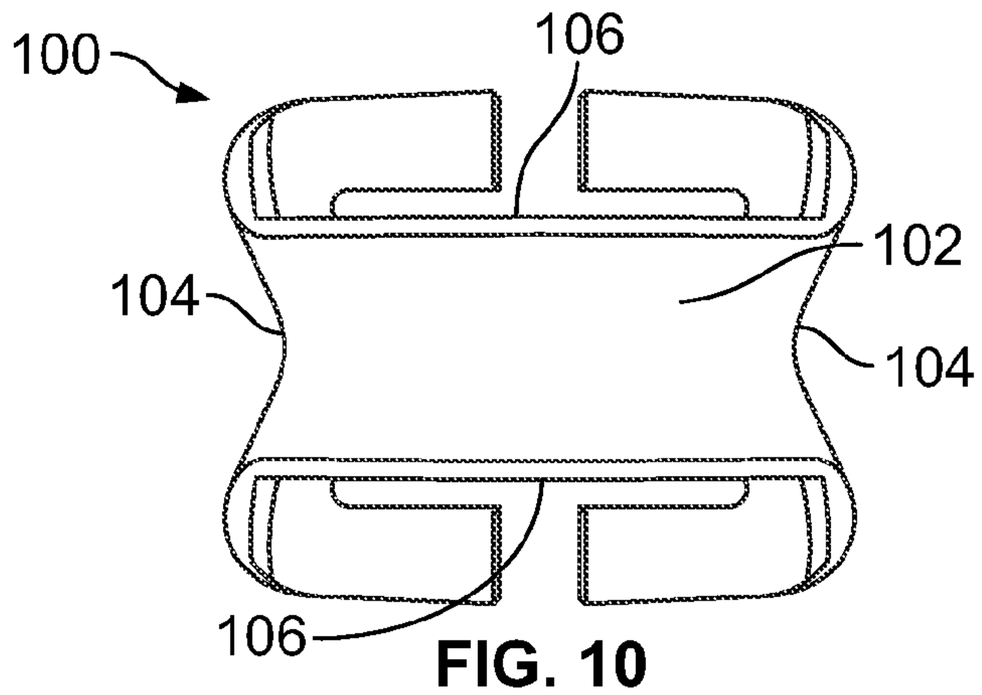


FIG. 10

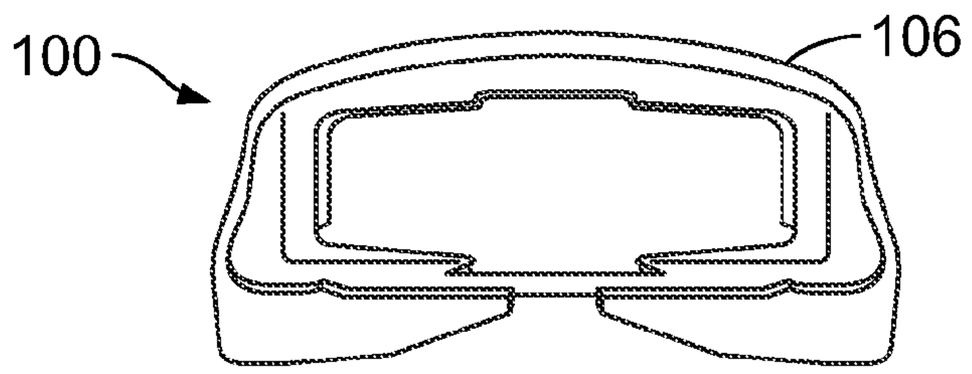


FIG. 11

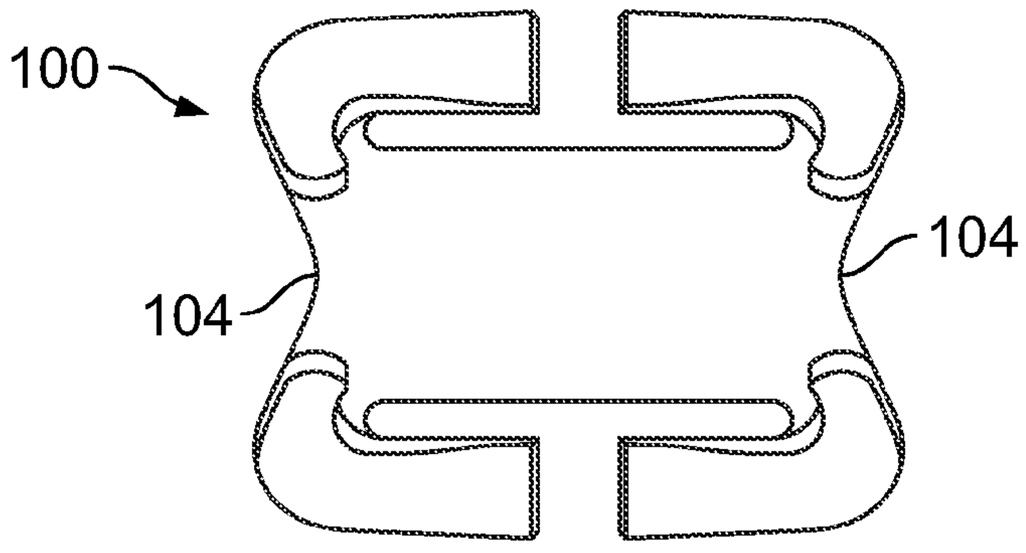


FIG. 12

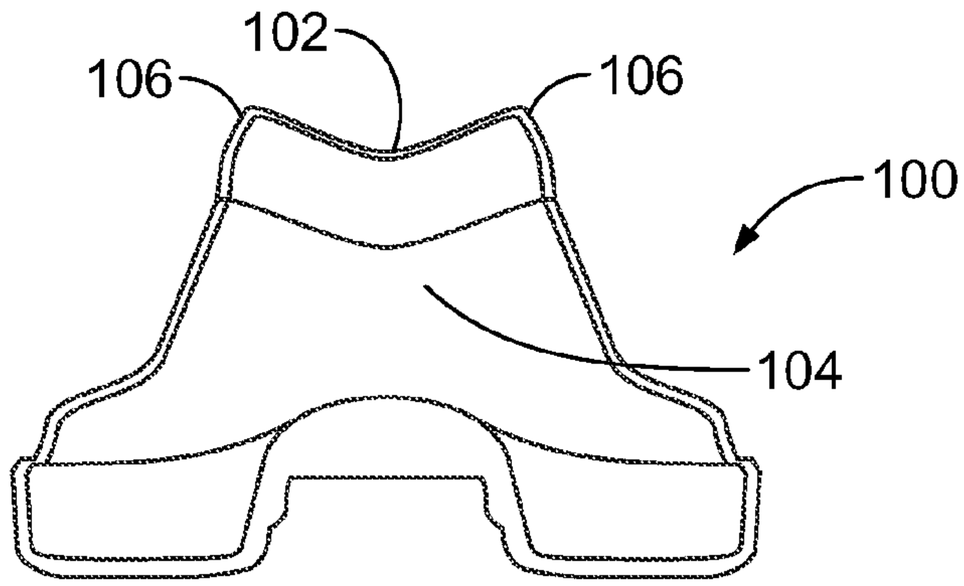


FIG. 13

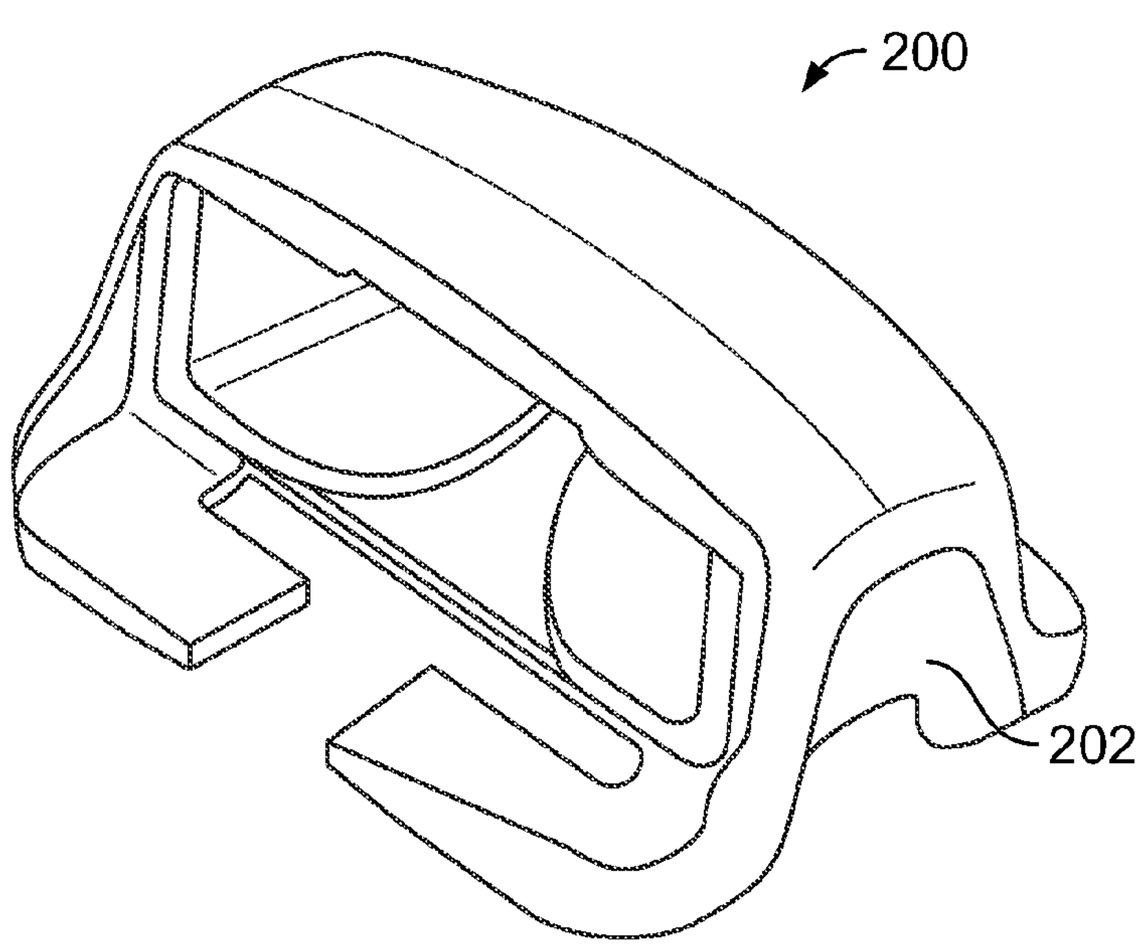


FIG. 14

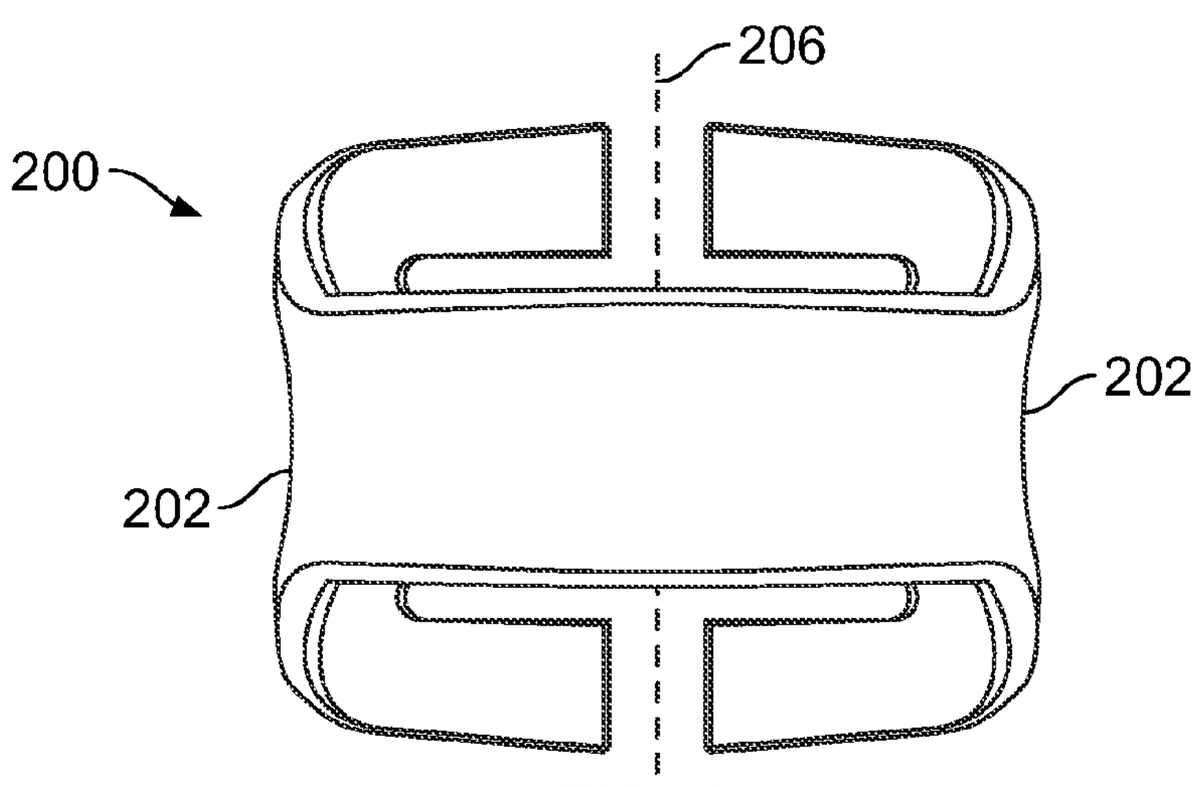


FIG. 15

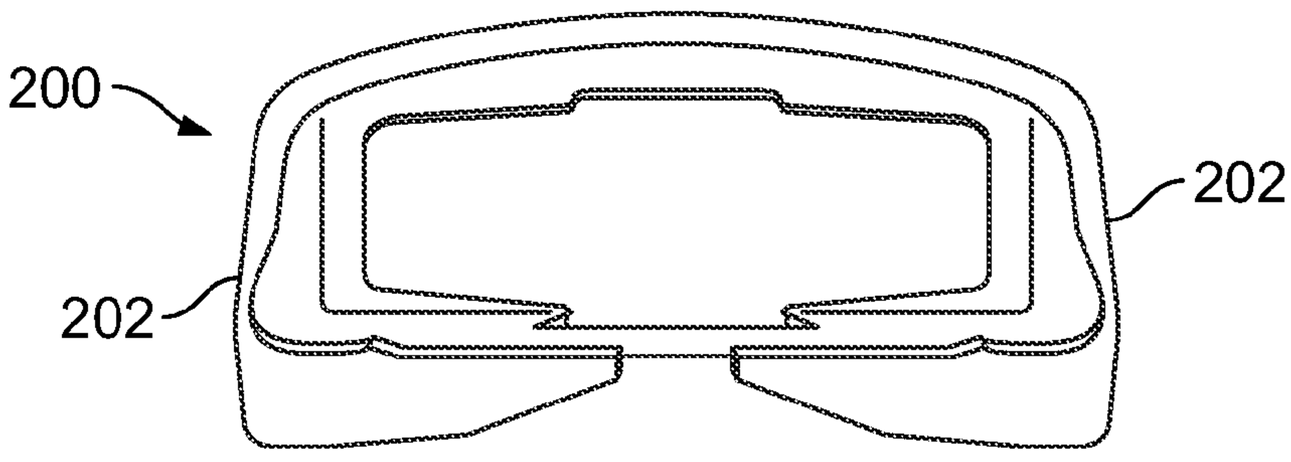


FIG. 16

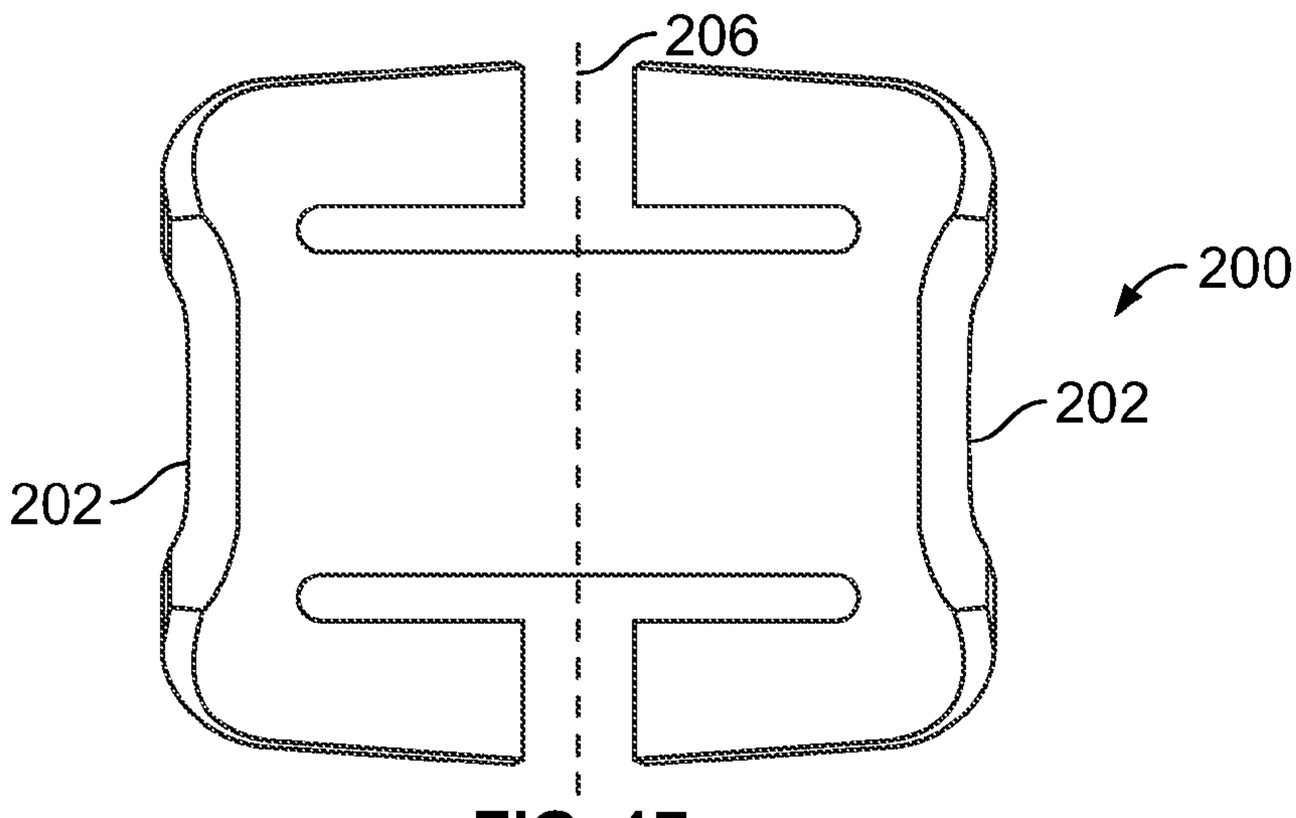


FIG. 17

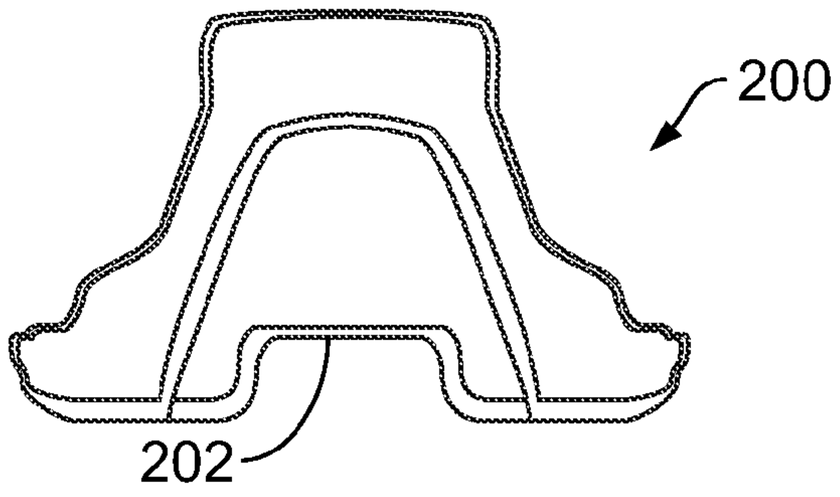


FIG. 18

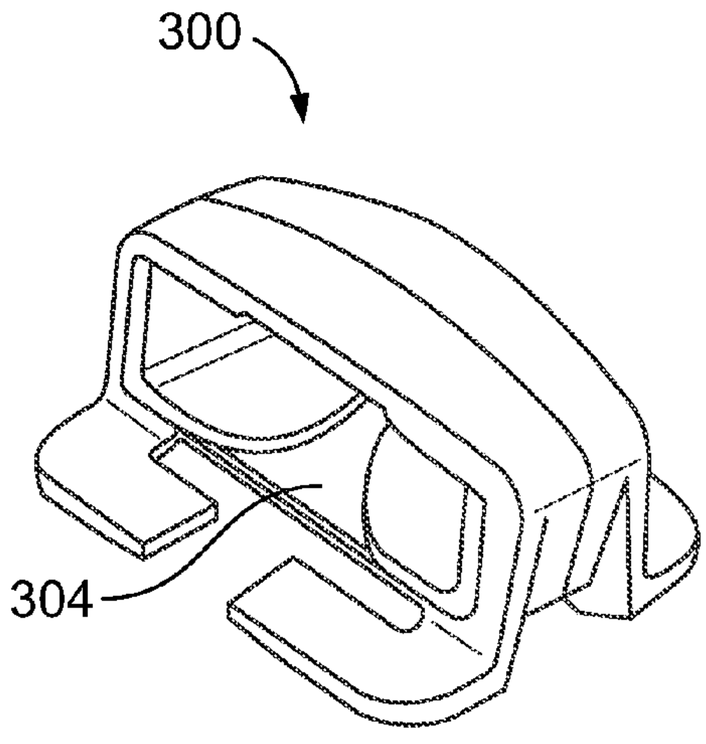


FIG. 19

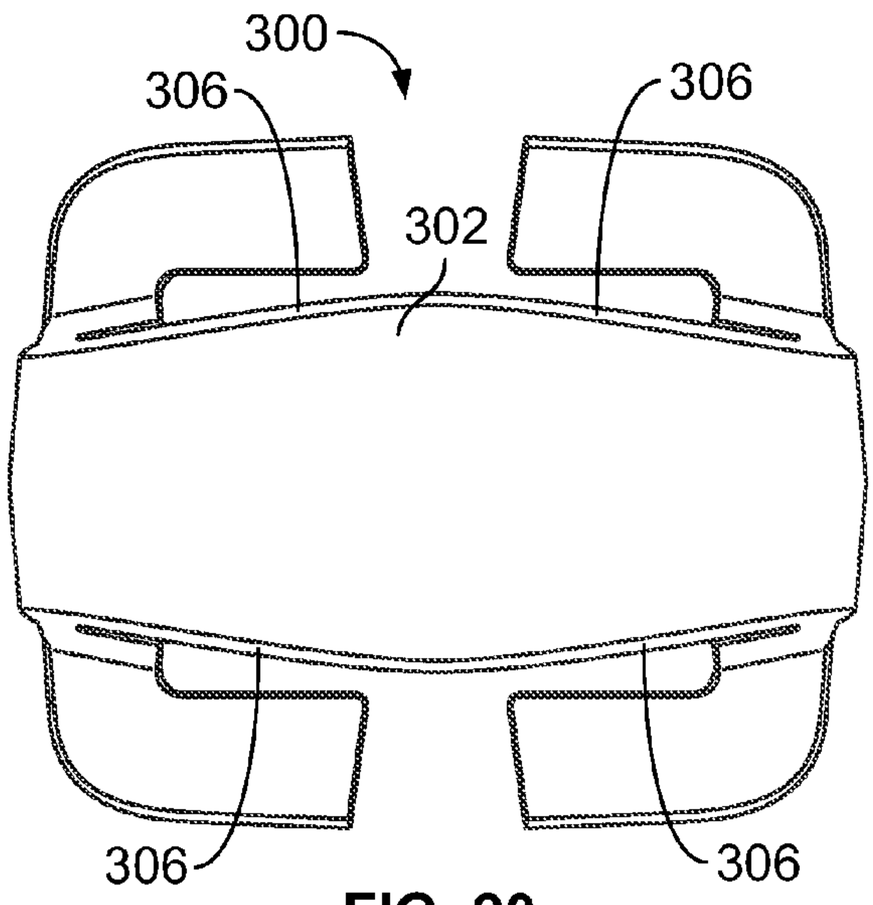


FIG. 20

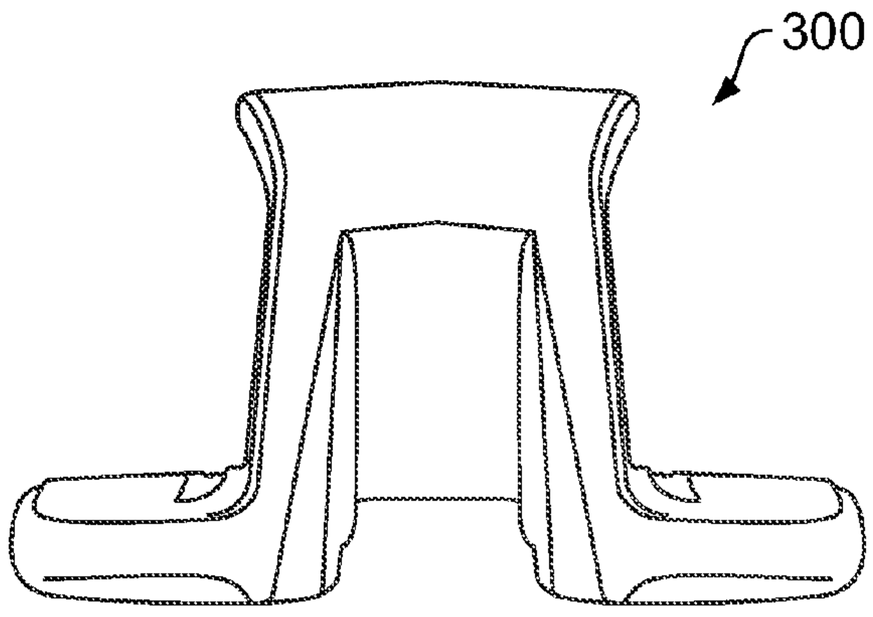


FIG. 21

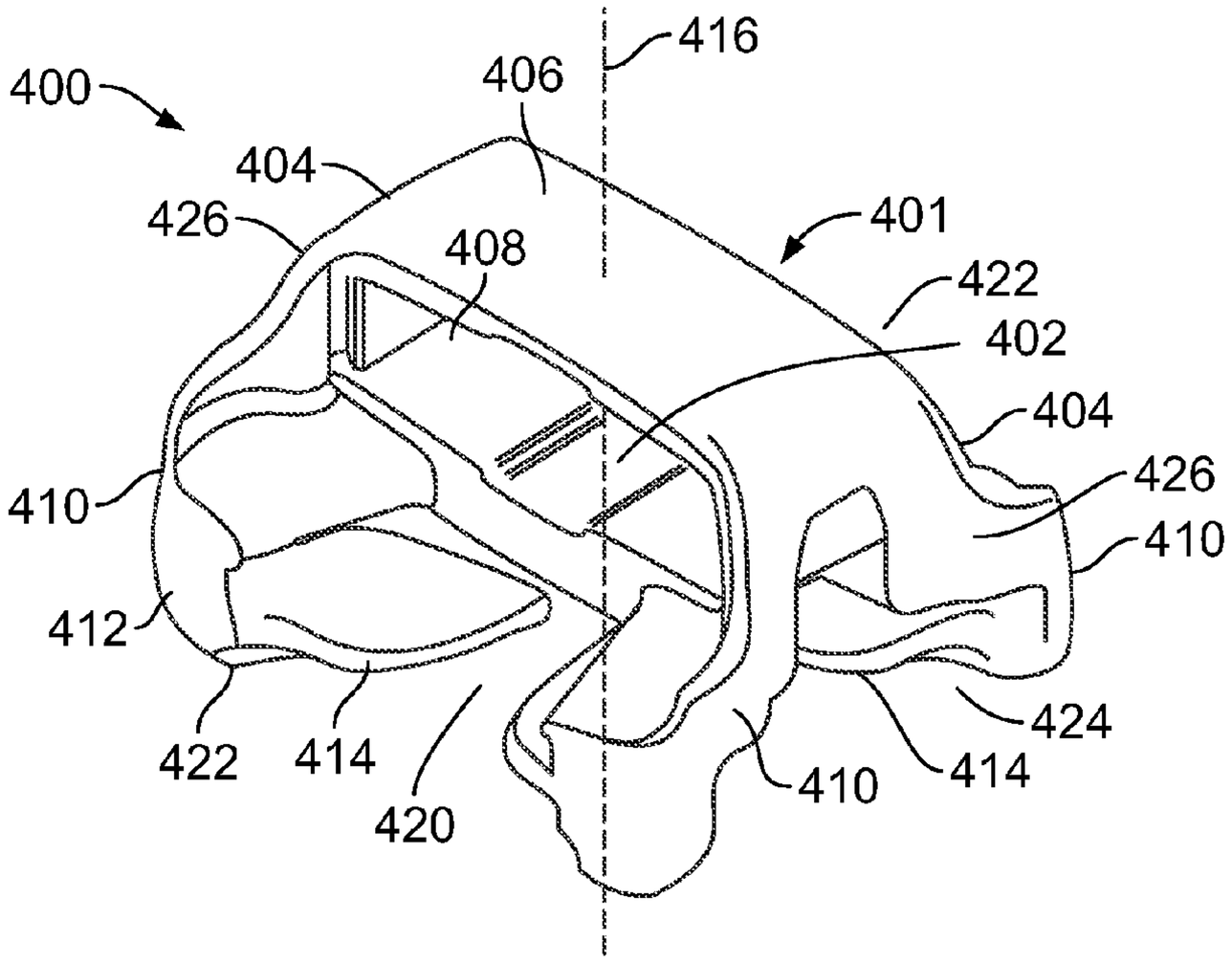


FIG. 22

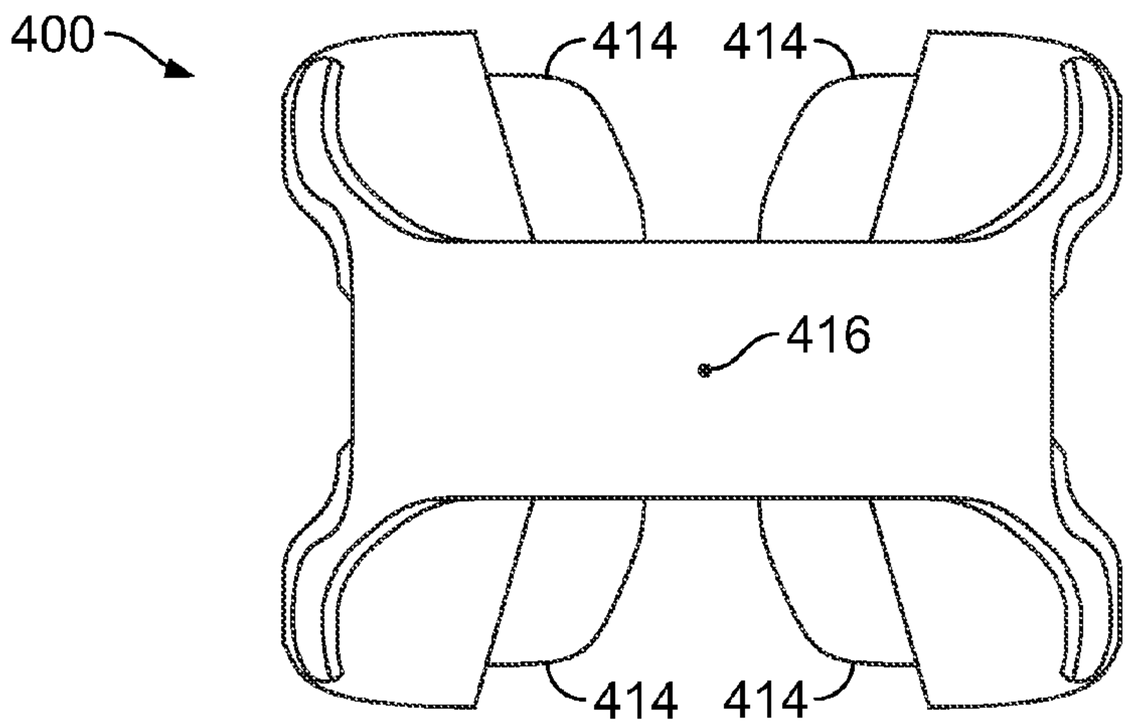


FIG. 23

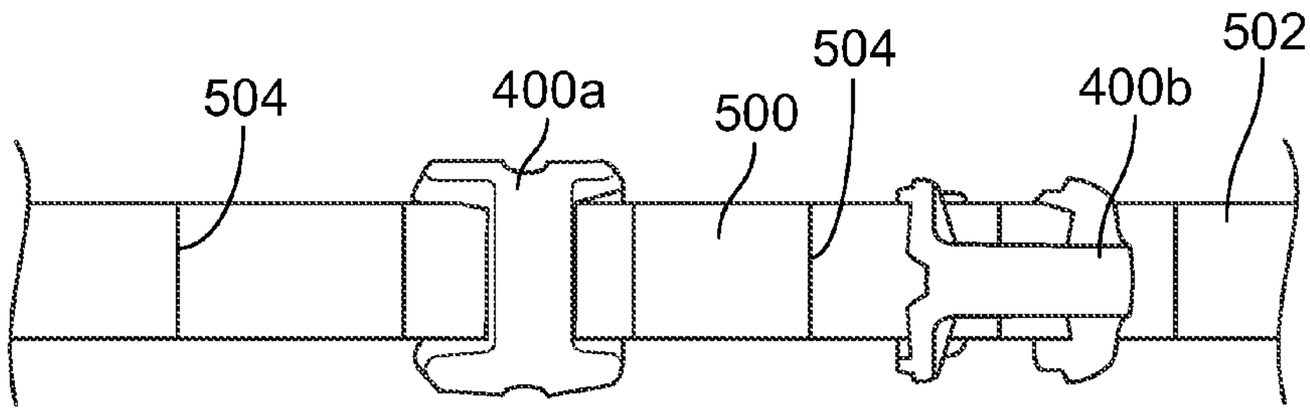


FIG. 29

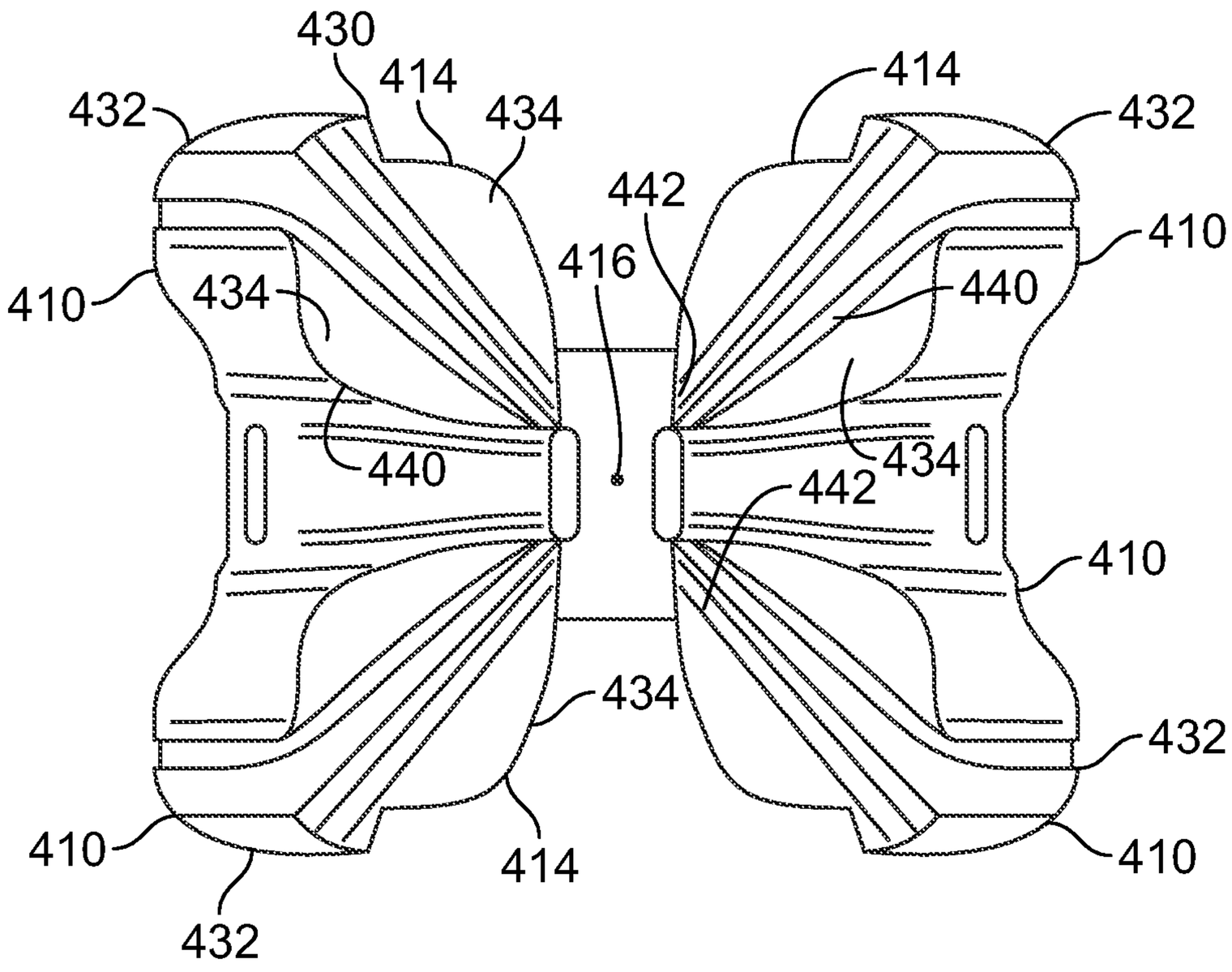

430
414
432
434
414
432
442
410
416
410
434
440
440
434
442
410
434
432
410
414
410
432

FIG. 24

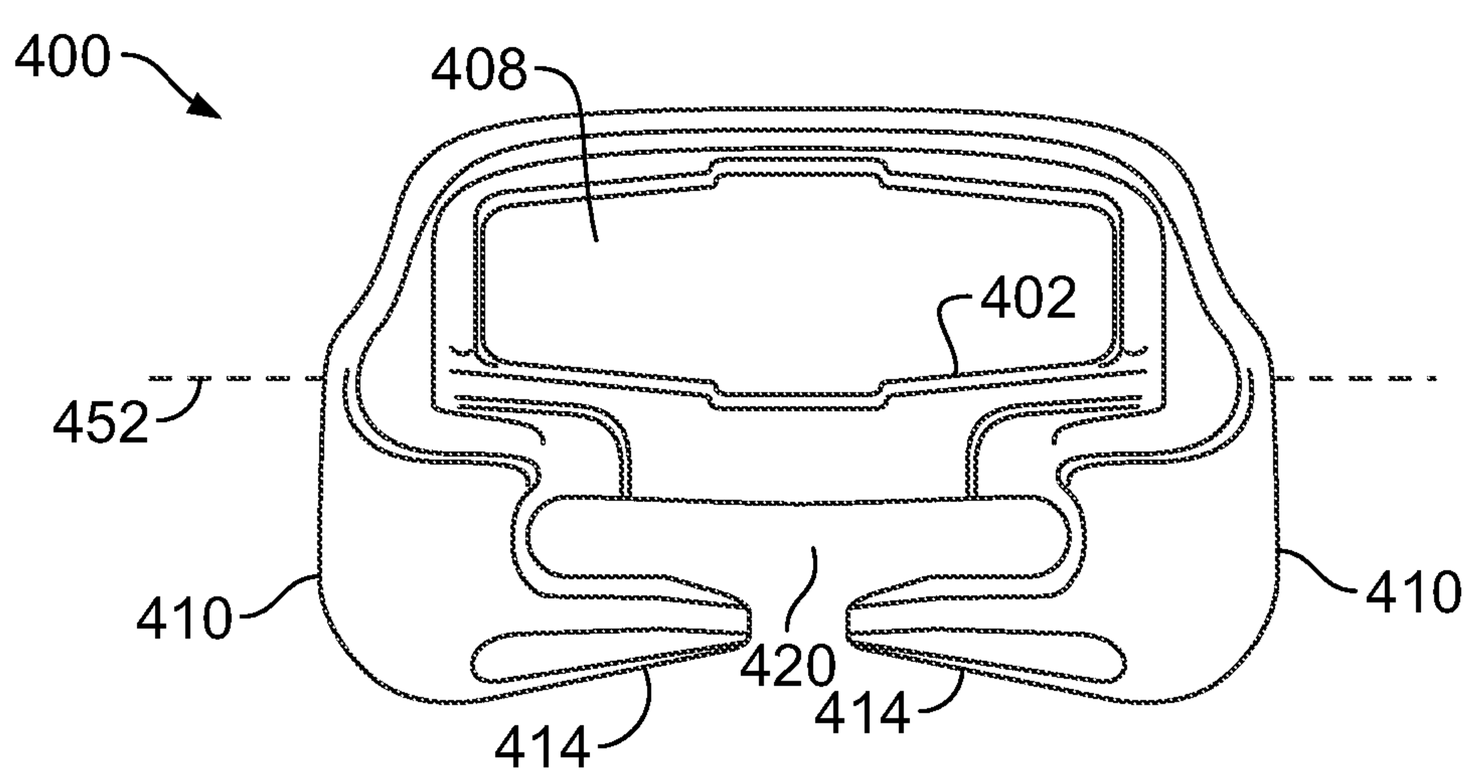

400
408
402
452
410
410
420
414
414

FIG. 25

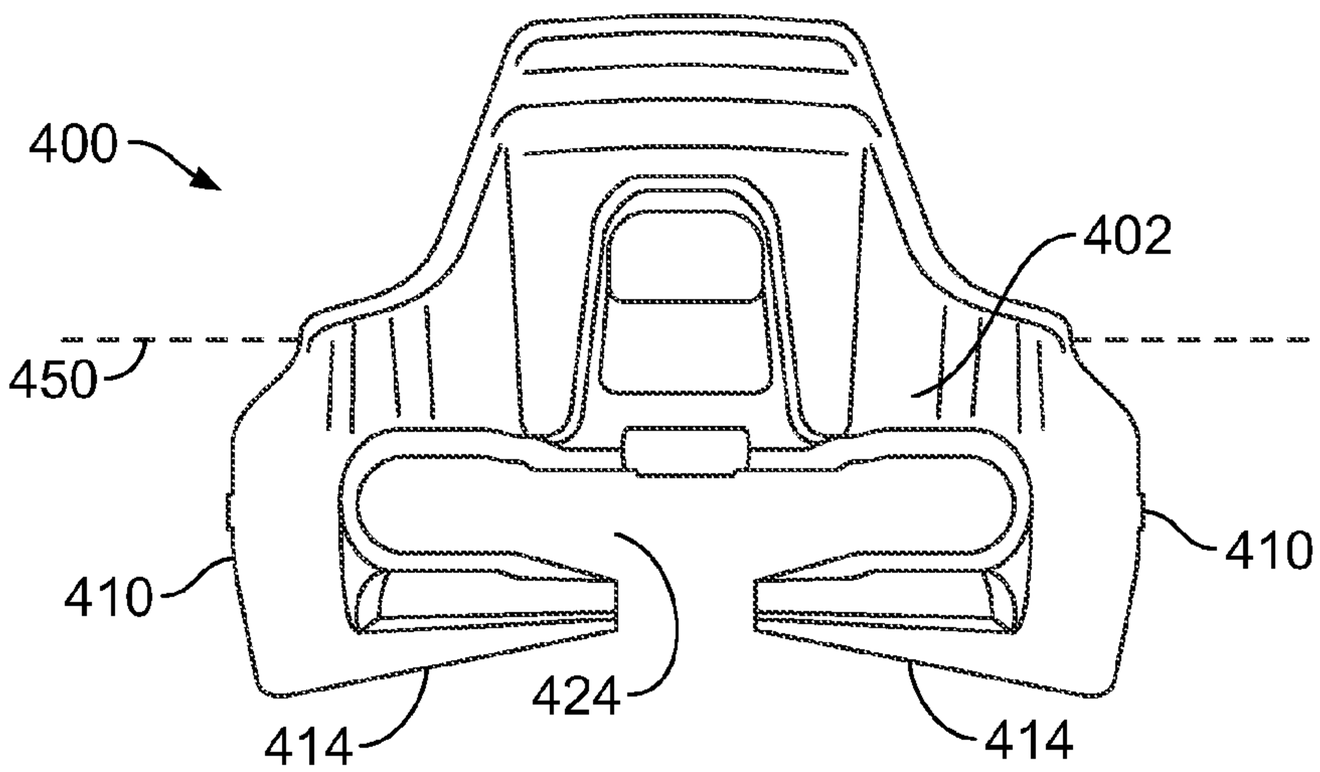


FIG. 26

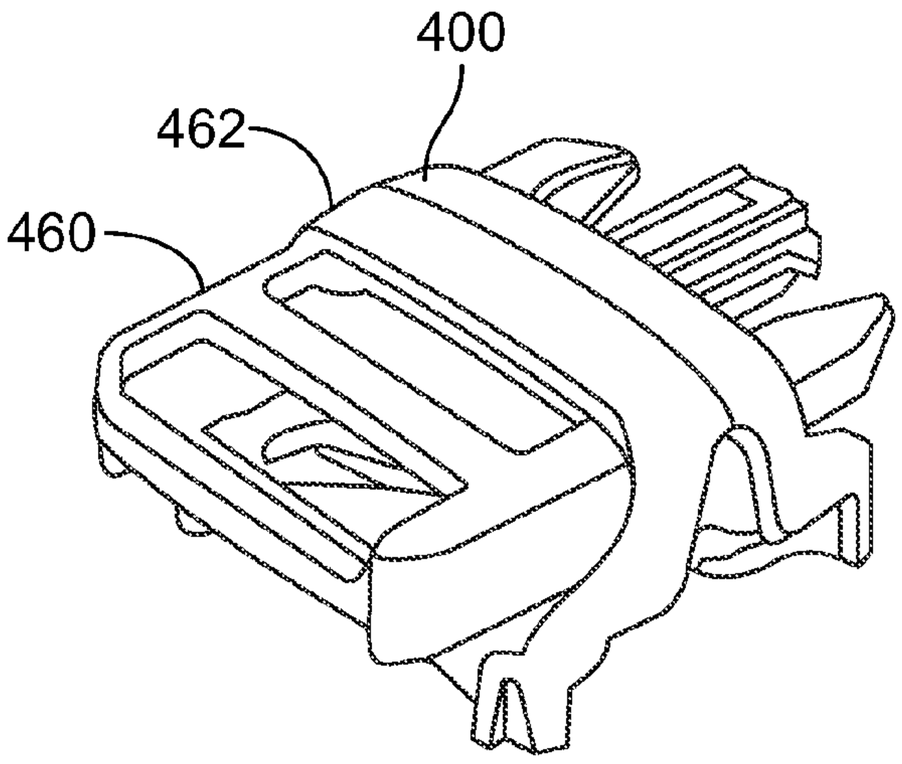


FIG. 27

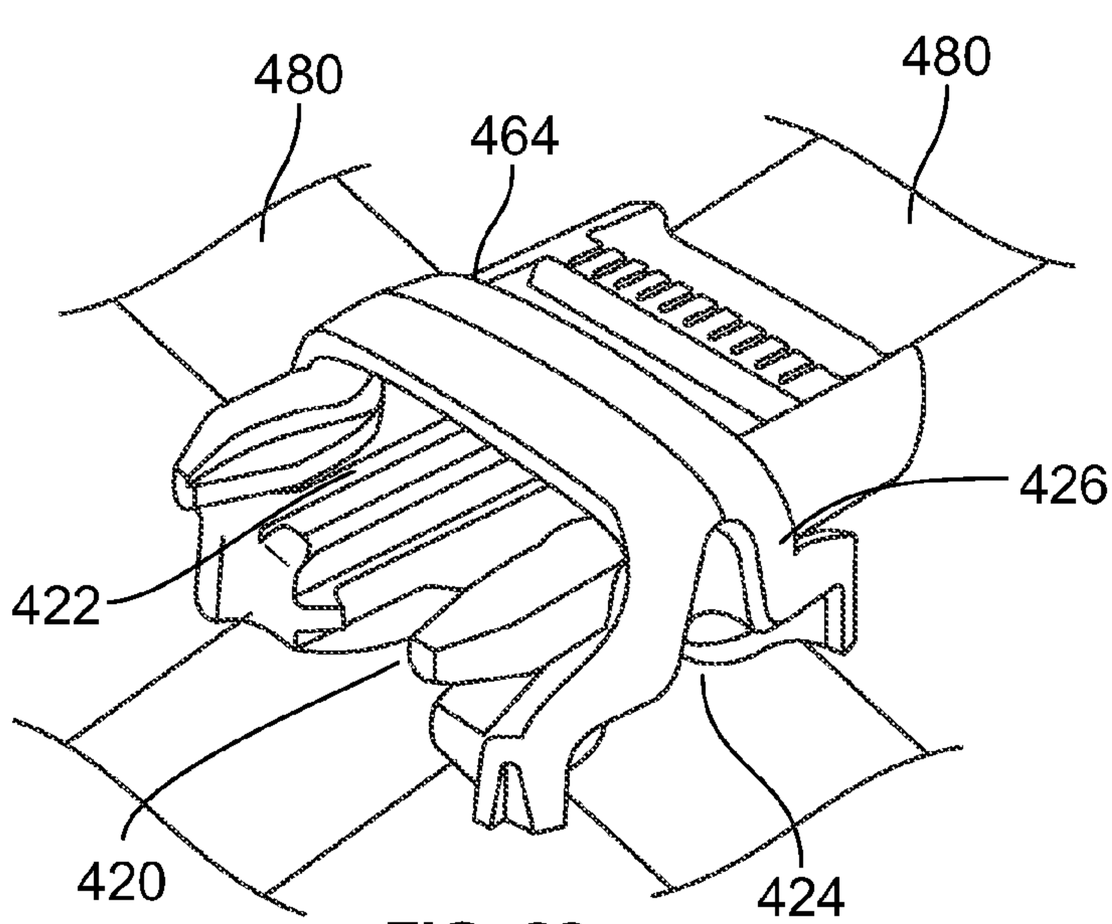


FIG. 28

MULTI-DIRECTIONAL BUCKLE ASSEMBLY

RELATED APPLICATIONS

The present application is a National Phase of International Application No. PCT/US2013/043930 filed Jun. 3, 2013 and relates to and claims priority benefits from U.S. Provisional Patent Application No. 61/656,074 filed Jun. 6, 2012, and U.S. Provisional Patent Application No. 61/701,035 filed Sep. 14, 2012, both of which are hereby incorporated by reference in their entireties.

FIELD OF EMBODIMENTS OF THE DISCLOSURE

Embodiments of the present disclosure generally relate to a buckle assembly, and, more particularly, to a female buckle member configured to securely connect to a male buckle member and webbing in multiple orientations.

BACKGROUND

Buckles are used to securely connect components together. For example, various bags, backpacks, and the like have male and female buckle members connected to straps, webbing, or the like. Each strap, for example, is looped through a web-retaining channel on a buckle member. In order to connect the looped straps together, the make buckle member is connected to the female buckle member.

A conventional side-release buckle assembly may include a male connection member that is configured to mate with a female connection member, such as shown and described in U.S. Pat. No. 5,465,472, entitled "Buckle." Each connection member is configured to retain a strap, such as a seatbelt or backpack strap. The male connection member includes integral buttons that may be engaged to release the male connection member from the female connection member, thereby disconnecting the buckle assembly.

Typically, a male buckle member having a latching device enters a reciprocal female buckle member from a first direction. Accordingly, one or both of the buckle members has a facing configured for proper mating. Additionally, a typical female buckle member has a housing that is configured to cover the latching device of the male buckle member when connected, thereby adding material and cost to the male buckle member.

In general, known buckle assemblies are configured to mate in a single direction. That is, a female buckle member receives the male connection member from one direction. Additionally, the buckle members are typically configured to retain a strap or webbing in a single orientation, which may limit the use of the buckle members.

SUMMARY OF EMBODIMENTS OF THE DISCLOSURE

Certain embodiments of the present disclosure provide a female buckle member configured to securely mate with a male buckle member. The female buckle member may include a housing having a base connected to opposed lateral walls and an upper wall. An insertion channel is defined between the base, the opposed lateral walls, and an upper wall. The housing may be symmetrical about longitudinal and lateral axes. First and second ends of the housing may have the same size and shape. The first and second ends are configured to receive an insertion end of a male buckle member.

The female buckle member may also include at least one male lock member extending from the base. The male lock member(s) is configured to securely connect to a reciprocal feature of the male buckle member. The at least one male lock member may include two opposed male lock members extending toward one another from the opposed lateral walls. The male lock member(s) may include rounded corners connected to an exposed end.

The female buckle member may also include a plurality of web-retainers extending from the base. The plurality of web-retainers are configured to adjustably retain webbing. The plurality of web-retainers may define web-retaining channels formed through the first and second ends of the housing. The plurality of web-retainers may also define web-retaining channels formed through first and second sides of the housing. Each of the plurality of web-retainers may include an extension beam connected to the base and a cross beam extending inwardly from the extension beam. In other embodiments, each of the plurality of web-retainers may include a retaining spade extending toward a central axis of the housing.

Certain embodiments of the present disclosure provide a female buckle member configured to securely mate with a male buckle member. The female buckle member may include a housing having first and second ends, first and second sides, and a base. A plurality of web-retainers may extend from the base. The plurality of web-retainers define a first web-retaining channel configured to adjustably retain webbing extending between the first and second ends, and a second web-retaining channel configured to adjustably retain webbing extending between the first and second sides. The first web-retaining channel is parallel to one of a longitudinal or lateral axis of the housing, and the second web-retaining channel is parallel to the other of the longitudinal or lateral axis of the housing.

Each of the plurality of web-retainers may include a retaining spade extending toward a central axis of the housing. The retaining spade may include a central rib and side fins on either side of the central rib. The central rib may taper down from an outer edge to a distal tip. Each of the side fins may be widest proximate to a mid-section of the retaining spade.

Certain embodiments of the present disclosure provide a female buckle member configured to securely mate with a male buckle member and adjustably retain webbing through multiple directions. The female buckle member may include a housing having first and second ends and first and second sides. The housing may include a base connected to opposed lateral walls and an upper wall. An insertion channel is defined between the base, the opposed lateral walls, and an upper wall. The housing may be symmetrical about longitudinal and lateral axes. First and second ends of the housing may have the same size and shape. The first and second ends may be configured to receive an insertion end of a male buckle member. The female buckle member may also include a plurality of web-retainers extending from the base. The plurality of web-retainers define a first web-retaining channel configured to adjustably retain webbing extending between the first and second ends, and a second web-retaining channel configured to adjustably retain webbing extending between the first and second sides. The first web-retaining channel is parallel to one of the longitudinal or lateral axis of the housing. The second web-retaining channel is parallel to the other of the longitudinal or lateral axis of the housing.

BRIEF DESCRIPTION OF SEVERAL VIEWS OF THE DRAWINGS

FIG. **1** illustrates an isometric top view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **2** illustrates a top view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **3** illustrates an end view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **4** illustrates a bottom view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **5** illustrates a lateral view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **6** illustrates an internal view of a base of a female buckle member, according to an embodiment of the present disclosure.

FIG. **7** illustrates an isometric top view of a female buckle member securely retaining a male buckle member from a first end, according to an embodiment of the present disclosure.

FIG. **8** illustrates an isometric top view of a female buckle member securely retaining a male buckle member from a second end, according to an embodiment of the present disclosure.

FIG. **9** illustrates an isometric top view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **10** illustrates a top view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **11** illustrates an end view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **12** illustrates a bottom view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **13** illustrates a lateral view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **14** illustrates an isometric top view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **15** illustrates a top view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **16** illustrates an end view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **17** illustrates a bottom view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **18** illustrates a lateral view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **19** illustrates an isometric top view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **20** illustrates a top view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **21** illustrates an end view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **22** illustrates an isometric top view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **23** illustrates a top view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **24** illustrates a bottom view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **25** illustrates an end view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **26** illustrates a lateral view of a female buckle member, according to an embodiment of the present disclosure.

FIG. **27** illustrates an isometric top view of a female buckle member securely retaining a male buckle member from a first end, according to an embodiment of the present disclosure.

FIG. **28** illustrates an isometric top view of a female buckle member securely retaining a male buckle member from a second end, according to an embodiment of the present disclosure.

FIG. **29** illustrates a front view of a female buckle members secured to webbing of a component, according to an embodiment of the present disclosure.

Before the embodiments of the disclosure are explained in detail, it is to be understood that the disclosure is not limited in its application to the details of construction and the arrangement of the components set forth in the following description or illustrated in the drawings. The disclosure is capable of other embodiments and of being practiced or being carried out in various ways. Also, it is to be understood that the phraseology and terminology used herein are for the purpose of description and should not be regarded as limiting. The use of "including" and "comprising" and variations thereof is meant to encompass the items listed thereafter and equivalents thereof as well as additional items and equivalents thereof.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE DISCLOSURE

Certain embodiments of the present disclosure provide a female buckle member configured to receive and securely retain a male buckle member from either end. As such, the female buckle member is not limited to a particular position or orientation with respect to a component and/or the male buckle member. Embodiments of the present disclosure provide a bi-directional web-mounted side release buckle housing having a low profile. Accordingly, embodiments provide greater flexibility when orienting buckle members. Additionally, embodiments provide a female buckle member having a housing with less material than many known female buckle members. Further, certain embodiments of the present disclosure provide a female buckle member that is configured to receive webbing from either end or either side. It is to be understood that the terms web or webbing refer to webbing, straps, ropes, fabric, sheets, or the like that are configured to be adjustably secured by a female or buckle member.

FIG. **1** illustrates an isometric top view of a female buckle member **10**, according to an embodiment of the present disclosure. The female buckle member **10** may be integrally formed and molded as a single piece of injection-molded plastic, for example. Optionally, the female buckle member **10** may be formed of various other materials, such as metal.

The female buckle member **10** includes a housing **11** having a base **12** integrally connected to opposed lateral walls **14**, which, in turn, integrally connect to an upper wall **16**. The upper wall **16** may be formed as an arch, as shown in FIG. **1**. Alternatively, the upper wall **16** may be straight, downwardly-bowed, or the like. An insertion channel **18** is defined between the base **12**, the lateral walls **14**, and the upper wall **16**. The insertion channel **18** is configured to receive a male buckle member (not shown in FIG. **1**).

Web-retainers **20** extend downwardly from each corner of the base **12**. Each web-retainer **20** includes an extension beam **22** that extends downwardly from the base **12**. The extension beam **22** integrally connects to a crossbeam **24** that may generally be perpendicular to the extension beam **22**. Each crossbeam **24** may extend toward a central lateral axis **26** of the female buckle member **10**. The central lateral axis **26** is perpendicular to a central longitudinal axis **28** of the female buckle member **10**.

The crossbeams **24** may include planar upper surfaces **30** that are offset from front and rear ends of the base **12**. Additionally, the planar upper surfaces **30** may be positioned below a lower surface **32** of the base **12** such that a clearance area **34** is formed between a plane that contains the planar upper surfaces **30** and a plane that contains the lower surface

32. However, the planar upper surfaces **30** may be positioned at the same level as, or above the level of, the lower surface **32** of the base **12**. Webbing is configured to be adjustably retained within the clearance area **34**. Additionally, distal tips **38** of opposed crossbeams **24** are separated by gaps **40**. The gaps **40** allow the webbing to be moved into the clearance area **34**. Alternatively, the gaps **40** may be omitted, such that two contiguous crossbeams (instead of the four separate and distinct crossbeams **24** shown in FIG. **1**) are formed proximate to each end of the female buckle member **10**.

Male locking ledges **42** extend upwardly from the base **12** into the insertion channel **18**. The male locking ledges **42** are configured to securely retain reciprocal portions of a male buckle member.

FIG. **2** illustrates a top view of the female buckle member **10**, according to an embodiment of the present disclosure. As shown in FIG. **2**, the distal tips **38** of opposed crossbeams **24** are separated by gaps **40**. Further, the crossbeams **24** may be outwardly offset from the ends of the base **12** (hidden from view in FIG. **2**). Optionally, the crossbeams **24** may be positioned directly underneath the base **12**.

FIG. **3** illustrates an end view of the female buckle member **10**, according to an embodiment of the present disclosure. The male locking ledges **42** extend from a junction of the base **12** and a lateral wall **14**. Each male locking ledge **42** extends upwardly from the base **12** within the insertion channel **18**. The male locking ledges **42** are opposed, mirror, and extend toward one another. A central channel **44** is formed between the opposed male locking ledges **42**. Optionally, the female buckle member **10** may not include the male locking ledges **42**.

As shown in FIG. **3**, each of the crossbeams **24** may include a lower ramped surface **46** that angles downwardly from the distal tip **38**. As such, the crossbeams **24** may have beveled distal tips **38**. The beveled distal tips **38** decrease the material of the female buckle member **10**, thereby reducing weight and overall cost. Optionally, the distal tips **38** may not be angled or beveled.

FIG. **4** illustrates a bottom view of the female buckle member **10**, according to an embodiment of the present disclosure. Webbing (not shown) is configured to be inserted into a web passage defined by the web-retainers **20** and the base **12**. For example, webbing may be adjustably secured over the web-retainers **20** and underneath the base **12**.

FIG. **5** illustrates a lateral view of the female buckle member **10**, according to an embodiment of the present disclosure. As shown in FIG. **5**, the web-retainers **20** may extend below a surface of the base **12**. As such, a central lower recessed area **50** may be defined below the base **12**. The recessed area **12** is configured to allow attachment across a Pouch Attachment Ladder System (PALS), which is a grid of webbing used particularly in military applications. PALS is used to attach smaller equipment onto load-bearing platforms, such as vests and backpacks. In general, PALS includes webbing sewn onto load-bearing equipment and corresponding webbing and straps on the attachment. The straps may be interwoven between the webbing on each piece and snapped into place, thereby providing a secure fit that may be detached when desired.

FIG. **6** illustrates an internal view of the base **12** of the female buckle member **10**, according to an embodiment of the present disclosure. A male lock ledge **42** extends upwardly from the base **12** from each lateral wall **14**. Each lock ledge **42** may be as wide as the base **12**, and may include rounded corners **52** that connect to an exposed end **54** proximate to the central channel **44**. Optionally, the lock ledges **42** may be more or less wide than the base **12**, and/or include right angle corners connected to the exposed end **54**. The male lock ledges **42** may mirror and oppose one another and are configured to securely latch and lock onto reciprocal features of a male buckle member, such as undersides of latch arms. The male lock ledges **42** are symmetrical with respect to the longitudinal axis **28** and mirror one another with respect to the lateral axis **26**. In general, the female buckle member **10** is symmetrical about both axes **26** and **28**, and, indeed, mirrors itself about the axes **26** and **28**. Accordingly, the female buckle member **10** is configured to receive and securely retain an insertion end of a male buckle member from either end **60** or **62**.

FIG. **7** illustrates an isometric top view of the female buckle member **10** securely retaining a male buckle member **70** from a first end **60**, according to an embodiment of the present disclosure. The female buckle member **10** may adjustably retain webbing **72**, while the male buckle member **70** may adjustably retain webbing **74**. The male buckle member **70** may include opposed latching arms **76** that deflect inwardly as they pass into the insertion channel **18** (shown in FIG. **1**, for example) and flex out into at-rest positions as they pass out of the insertion channel, thereby securely latching the male buckle member **70** to the female buckle member **10**. The male lock ledges **42** (shown in FIGS. **1**, **3**, and **6**) may securely mate with reciprocal features formed on the male buckle member **70** to provide additional securing strength. Alternatively, the female buckle member **10** may not include the male lock ledges **42**.

The male buckle member **70** may be further described and shown in, for example, U.S. Pat. No. 7,331,088, entitled "Buckle Assembly," U.S. Pat. No. 7,296,327, entitled "Buckle Assembly," U.S. Pat. No. 7,302,742, entitled "Side Release Buckle Assembly," PCT Publication WO2012/162615, entitled "Buckle Assembly," United States Patent Application Publication No. 2007/0089280, entitled "Side Release Buckle Assembly," United States Patent Application Publication No. 2008/0222860, entitled "Buckle Assembly," and United States Patent Application Publication No. 2008/0078069, entitled "Strap Adjusting Assembly," all of which are hereby incorporated by reference in their entireties.

FIG. **8** illustrates an isometric top view of the female buckle member **10** securely retaining the male buckle member **70** from a second end **62**, according to an embodiment of the present disclosure. Because the female buckle member **10** has ends **60** and **62** that mirror one another and are the same size and shape, the female buckle member **10** may receive the insertion end of male buckle member **70** from either end **60** and **62**.

As shown in FIGS. **7** and **8**, only the upper wall **16** of the female buckle member **10** covers a mid-section **77** of the male buckle member **70**. The base and ends of the latching arms of the male buckle member **70** may be exposed. The female buckle member does not substantially cover the male buckle member **70**. Instead, the female buckle member **10** is a light weight buckle member that is capable of securely retaining the male buckle member from either end. The female buckle member **10** includes a housing that securely and reliably connects to the male buckle member **70** from either end, while providing a light-weight, cost-effective design having less material than many known buckles.

FIG. **9** illustrates an isometric top view of a female buckle member **100**, according to an embodiment of the present disclosure. FIG. **10** illustrates a top view of the female buckle member **100**. FIG. **11** illustrates an end view of the female buckle member **100**. FIG. **12** illustrates a bottom view of the female buckle member **100**. FIG. **13** illustrates a lateral view of the female buckle member **100**. Referring to FIGS. **9-13**,

the female buckle member **100** is similar to the female buckle member **10**, except that the female buckle member **100** includes a top wall **102** and lateral walls **104** bounded by outer rims **106** having inwardly bowed surfaces therebetween. The outer rims **106** provide support to the top wall **102** and the lateral walls **104**, while the inwardly bowed surfaces provide an ergonomic engagement area configured to allow a user to easily grasp.

FIG. **14** illustrates an isometric top view of a female buckle member **200**, according to an embodiment of the present disclosure. FIG. **15** illustrates a top view of the female buckle member **200**. FIG. **16** illustrates an end view of the female buckle member **200**. FIG. **17** illustrates a bottom view of the female buckle member **200**. FIG. **18** illustrates a lateral view of the female buckle member **200**. Referring to FIGS. **14-18**, the female buckle member **200** is similar to the female buckle member **10**, except that the female buckle member **200** includes lateral walls **202** that are set further in toward the lateral axis **206**, thereby providing a female buckle member having less material weight.

FIG. **19** illustrates an isometric top view of a female buckle member **300**, according to an embodiment of the present disclosure. FIG. **20** illustrates a top view of the female buckle member **300**. FIG. **21** illustrates an end view of the female buckle member **300**. Referring to FIGS. **19-21**, the female buckle member **300** is similar to the female buckle member **10**, except that the female buckle member **300** includes a top wall **302** and base **304** having tapered ends **306**, thereby providing a female buckle member having less material weight.

Unlike previous buckle assemblies, embodiments of the present disclosure provide a compact female buckle member that covers only areas of the latching arms of male buckle members between the webbing and lock ledges of the latching arms. Additionally, as noted above, unlike previous buckle assemblies, embodiments provide a female buckle member that is able to receive and retain the latching arms from either end. Embodiments provide a female buckle member that is compact and that is able to receive and retain a male buckle member from either end without having to reposition the female buckle member.

FIG. **22** illustrates an isometric top view of a female buckle member **400**, according to an embodiment of the present disclosure. The female buckle member **400** is similar to the female buckle member **10** in that the female buckle member **400** includes a housing **401** having a base **402** integrally connected to lateral walls **404**, which, in turn, are integrally connected to a top wall **406**. An insertion channel **408** is defined between the base **402**, the lateral walls **404**, and the top wall **406**.

Web-retainers **410** extend downwardly from the four corners of the base **402**. However, each web retainer **410** includes an extension beam **412** integrally connected to a planar retaining spade **414** that extends toward a central vertical axis **416** of the female buckle member **400**. Accordingly, web-retaining channels **420** are defined at the ends **422** of the female buckle member **400**, while web-retaining channels **424** are defined at the sides **426** of the female buckle member **400**.

FIG. **23** illustrates a top view of the female buckle member **400**, according to an embodiment of the present disclosure. As shown in FIG. **23**, the retaining spades **414** extend inwardly from positions proximate to the four corners of the base **402** and toward a central vertical axis **416** of the female buckle member **400**.

FIG. **24** illustrates a bottom view of the female buckle member **400**, according to an embodiment of the present disclosure. Each retaining spade **414** may include a central rib **430** extending through a length thereof. The central rib **430** may taper down from an outer edge **432** toward the central vertical axis **416**. Side fins **434** expand outwardly from the outer edge **432** about the central rib **430** toward a mid-section **440**. The side fins **434** taper back down from the mid-section **440** toward a distal tip **442**. As such, the retaining spades **414** may be shaped as spades, leaves, or the like. The shape of the retaining spades **414** allows webbing to be inserted into and adjustably secured within web passages aligned with either the longitudinal or lateral axes of the female buckle member **400**.

Alternatively, instead of retaining spades, four posts may extend downwardly from the base **402** and connect to a planar web plate that is parallel with the base **402**. In this manner, perpendicular web passages may be formed, such that one is parallel with the longitudinal axis, and the other is parallel with the lateral axis. However, in this embodiment, webbing may not be quickly and easily inserted into the web passages. Instead, a first end of the webbing would be inserted into a web passage, and eventually connected to an opposite end of the webbing.

FIG. **25** illustrates an end view of the female buckle member **400**, according to an embodiment of the present disclosure. The web-retaining channels **420** are formed between the web-retainers **410** and the base **402** at the ends **422** (shown in FIG. **22**). As such, webbing may be adjustably secured through the ends **422** of the female buckle member **400**.

FIG. **26** illustrates a lateral view of the female buckle member **400**, according to an embodiment of the present disclosure. The web-retaining channels **424** are formed between the web-retainers **410** and the base **402** at the sides **426** of the female buckle member **400**. Accordingly, webbing may be adjustably secured through the sides **426** (shown in FIG. **22**) of the female buckle member **400**. Referring to FIGS. **25** and **26**, unlike previously-known buckle members, the female buckle member **400** may be adjustably secured with respect to webbing along longitudinal or lateral axes **450** and **452**, respectively.

FIG. **27** illustrates an isometric top view of the female buckle member **400** securely retaining a male buckle member **460** from a first end **462**, according to an embodiment of the present disclosure. FIG. **28** illustrates an isometric top view of the female buckle member **400** securely retaining the male buckle member **460** from a second end **464**, according to an embodiment of the present disclosure. Referring to FIGS. **27** and **28**, the female buckle member **400** may receive and retain the male buckle member **460** through either end **462** or **464**, as described above. Further, the female buckle member **400** may be adjustably secured with respect to webbing **480** that passes through web-retaining channels **420** formed through the ends **422** and/or web-retaining channels **424** that pass through the sides **426**.

FIG. **29** illustrates a front view of female buckle members **400***a* and **400***b* secured to webbing **500** of a component **502**, according to an embodiment of the present disclosure. The webbing **500** may be PALS webbing having stitches **504** that secure the webbing **500** to fabric, such as that of a backpack, tactical vest, or the like. The female buckle member **400***a* is shown adjustably secured to the webbing **500** passing through the ends of the female buckle member **400***a*. The female buckle member **400***b* is shown adjustably secured to the webbing **500**, across a stitch **504**, such that the webbing **500** passes through sides of the female buckle member **400***b*. Each of the female buckle members **400***a* and **400***b* may receive and retain a male buckle member through either end, as described above.

As shown in FIGS. **22-29**, for example, embodiments of the present disclosure provide a 4-way female buckle member **400** that is configured to receive and securely retain a male buckle member from either end, while adjustably retaining webbing along longitudinal or lateral axes. The female buckle member **400** may securely receive webbing through either end, or either side. As such, the female buckle member **400** may receive and retain webbing from four different directions, as shown in FIG. **28**, for example.

Embodiments of the present disclosure provide a multi-directional web-mounted side release buckle housing having a low profile. Accordingly, embodiments of the present disclosure provide greater flexibility when orienting buckle members. Additionally, embodiments of the present disclosure provide a female buckle member including a housing having less material than many known female buckle members.

The web-retainers **410** having the retaining spades **414** may be used with any of the embodiments of the present disclosure, including any of the embodiments shown and described with respect to FIGS. **1-29**.

While various spatial and directional terms, such as top, bottom, lower, mid, lateral, horizontal, vertical, front and the like may be used to describe embodiments of the present disclosure, it is understood that such terms are merely used with respect to the orientations shown in the drawings. The orientations may be inverted, rotated, or otherwise changed, such that an upper portion is a lower portion, and vice versa, horizontal becomes vertical, and the like.

Variations and modifications of the foregoing are within the scope of the present disclosure. It is understood that the embodiments disclosed and defined herein extend to all alternative combinations of two or more of the individual features mentioned or evident from the text and/or drawings. All of these different combinations constitute various alternative aspects of the present disclosure. The embodiments described herein explain the best modes known for practicing the disclosure and will enable others skilled in the art to utilize the disclosure. The claims are to be construed to include alternative embodiments to the extent permitted by the prior art.

Various features of the disclosure are set forth in the following claims.

The invention claimed is:

1. A female buckle member configured to securely mate with a male buckle member, the female buckle member comprising:

a housing including a base connected to opposed lateral walls and an upper wall, wherein an insertion channel is defined between the base, the opposed lateral walls, and an upper wall, wherein first and second ends of the housing have the same size and shape, and wherein the first and second ends are configured to receive an insertion end of a male buckle member; and

a plurality of web-retainers extending from the base, wherein the plurality of web-retainers are configured to adjustably retain webbing.

2. The female buckle member of claim **1**, further comprising at least one male lock member extending from the base, wherein the at least one male lock member is configured to securely connect to a reciprocal feature of the male buckle member.

3. The female buckle member of claim **2**, wherein the at least one male lock member comprises two opposed male lock members extending toward one another from the opposed lateral walls.

4. The female buckle member of claim **2**, wherein the at least one male lock member comprises rounded corners connected to an exposed end.

5. The female buckle member of claim **1**, wherein the plurality of web-retainers define web-retaining channels formed through the first and second ends of the housing.

6. The female buckle member of claim **1**, wherein the plurality of web-retainers define web-retaining channels formed through first and second sides of the housing.

7. The female buckle member of claim **1**, wherein each of the plurality of web-retainers includes an extension beam connected to the base and a cross beam extending inwardly from the extension beam.

8. The female buckle member of claim **1**, wherein each of the plurality of web-retainers includes a retaining spade extending toward a central axis of the housing.

9. A female buckle member configured to securely mate with a male buckle member, the female buckle member comprising:

a housing having first and second ends, first and second sides, and a base; and

a plurality of web-retainers extending from the base, wherein the plurality of web-retainers define a first web-retaining channel configured to adjustably retain webbing extending between the first and second ends, and a second web-retaining channel configured to adjustably retain webbing extending between the first and second sides, wherein the first web-retaining channel is parallel to one of a longitudinal or lateral axis of the housing, and wherein the second web-retaining channel is parallel to the other of the longitudinal or lateral axis of the housing.

10. The female buckle member of claim **9**, wherein the housing further comprises opposed lateral walls connected to the base, and an upper wall connected to the lateral walls, wherein an insertion channel is defined between the base, the opposed lateral walls, and an upper wall.

11. The female buckle member of claim **9**, further comprising at least one male lock member extending from the base, wherein the at least one male lock member is configured to securely connect to a reciprocal feature of the male buckle member.

12. The female buckle member of claim **9**, wherein each of the plurality of web-retainers includes a retaining spade extending toward a central axis of the housing.

13. The female buckle member of claim **12**, wherein the retaining spade comprises a central rib and side fins on either side of the central rib.

14. The female buckle member of claim **13**, wherein the central rib tapers down from an outer edge to a distal tip, and wherein each of the side fins is widest proximate to a mid-section of the retaining spade.

15. A female buckle member configured to securely mate with a male buckle member and adjustably retain webbing through multiple directions, the female buckle member comprising:

a housing having first and second ends and first and second sides, the housing comprising a base connected to opposed lateral walls and an upper wall, wherein an insertion channel is defined between the base, the opposed lateral walls, and an upper wall, wherein the housing is symmetrical about longitudinal and lateral axes, wherein the first and second ends of the housing have the same size and shape, and wherein the first and second ends are configured to receive an insertion end of a male buckle member; and

a plurality of web-retainers extending from the base, wherein the plurality of web-retainers define a first web-retaining channel configured to adjustably retain webbing extending between the first and second ends, and a second web-retaining channel configured to adjustably retain webbing extending between the first and second sides, wherein the first web-retaining channel is parallel to one of the longitudinal or lateral axis of the housing, and wherein the second web-retaining channel is parallel to the other of the longitudinal or lateral axis of the housing.

16. The female buckle member of claim **15**, further comprising two opposed male lock members extending from the base and toward one another from the opposed lateral walls.

17. The female buckle member of claim **15**, wherein each of the plurality of web-retainers includes a retaining spade extending toward a central axis of the housing.

18. The female buckle member of claim **17**, wherein the retaining spade comprises a central rib and side fins on either side of the central rib.

19. The female buckle member of claim **18**, wherein the central rib tapers down from an outer edge to a distal tip, and wherein each of the side fins is widest proximate to a mid-section of the retaining spade.

* * * * *